

# Industrial Energy Efficiency Project Compressed Air System Optimization

Typically over 75% of the lifetime costs of compressed air system are energy related. This case reviews the optimisation of compressed air system at EgyFood factory, in order to identify opportunities for saving the energy consumption by that system. The study reveals compressed air system opportunities assessed in this plant, 491,510 kWh (or EGP 319,475 in 2017 and then EGP 390,000 onwards) per annum could be saved at a low investment cost.

## EGYPT

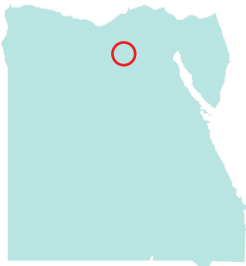
### A Case Study of EgyFood Company

#### EgyFood Snapshot

**Industry:** Food

**Location:** Giza,  
Egypt

**Product:** Jucies and  
Dairy products



**Implementation cost:** Low

**System:** Screw Air Compressors

**Annual energy savings:** ~ 491.5 MWh

**Financial savings:** ~ 319,475 EGP/year

**GHG reduction:** ~265.5 tCO<sub>2</sub>eq

**Overall payback:** < 1 month

Juhayna EgyFood Industries is one of the pioneer companies in Egypt working on the production of dairy, juice, and cooking products established in 1983 and has expanded its presence in the Middle East. The company is one of the pioneer companies in Egypt, working on the production of dairy and juice products. EgyFood was founded in 2014 in 6th of October, Giza. It has a production of high-quality yoghurts and yoghurt drinks including Rayeb and Zabado.



### CASO at EgyFood and the IEE Project

The Industrial Energy Efficiency Project (IEE) is a programme developed and initiated by UNIDO to promote energy efficiency in industry as part of its primary objective “promoting and accelerating inclusive and sustainable industrial development in developing countries and economies in transition.”

The Compressed Air Systems Optimisation (CASO) Project forms part of the IEE Project and has the specific objectives of developing local personnel to become competent in the application of energy efficiency in industry in order to unlock the potential for energy savings within their respective local industries.

The Egyptian Company for Food industries (EgyFood) is considered as a pilot plant for the IEEP in the MSO as well as other components. They are in the process of developing an Energy Management System (EnMS) with the assistance from the IEEP, and the MSO serves pretty well in developing saving opportunities for the company. It needs to reduce operating costs to remain competitive in the global market. The mandated electricity tariff increases have also contributed to this need. Since compressors consume a large proportion of electrical energy, EgyFood company has focussed on motor system improvements.

## Summary of Optimization Strategies

Saving Opportunity	Energy Savings (kWh/year)	Financial Savings (EGP)	Capital Cost (EGP)	Payback (Year)
Reducing screw compressors pressure settings	110,165	71,600	Low	< month
Fixing Air Leakages	381,345	247,875	Low	< month
Total:	491,510	319,475	Low	< month

### Case Description

The compressed air system at EgyFood consists of three separate networks. One network to supply the whole factory compressed air requirements except the plastic lines and the other two networks to supply each of the plastic lines separately. Successful implementation could realize energy savings but also serve as a stepping stone to realize more energy savings in other areas of production.

Network 1 has Two identical Atlas Copco compressors 312 kW each. One compressor is in service while the other is standby and the operation is shifted between them in a regular base. The primary storage tanks consists of two tanks 6 m<sup>3</sup> each with automatic drainage valve. The compressed air then passes through filters and dryers before going to the process.

Network 2 and 3 is similar, Each has reciprocating compressor supply one of the plastic lines at 40 bar and a 0.3 m<sup>3</sup> primary storage tank for each compressor.

The major motor system of the two screw compressors was identified as significant energy user as It was observed that the compressors setting is adjusted to be load/unload between 9 - 9.5 bar, however the highest required pressure is 7 bar. Also, the engineering staff declared that the compressors are oversized for the factory air requirements.

The assessment involved reviewing process requirements, reviewing historical data, taking system measurements and developing optimisation solutions. This approach requires the engineers to develop a strong understanding of the system efficiency, operation and control conditions, as well as maintenance practices impact.

### Optimization Strategies

The study focused on the analysis of network 1 only. And two possible opportunities for energy saving in the compressed air system were identified. The first opportunity is to reduce the setting pressure of the screw compressors along with expanding the load/unload pressure band from 0.5 bar to 1 bar. The second opportunity is to Fix the existing compressed air leaks of the screw compressors network.

### Outcome

For the compressors system the company has implemented the solutions without problems by the factory with total savings amount of 491,510 kWh (or EGP 319,475) per annum at a low investment cost.

It is also suggested to increase the storage based on calculation about to 20 m<sup>3</sup>.

### Lessons Learnt

- Applying a structured approach to CASO can often realise with no or low cost requirements.
  - This case only realises 29% of total electricity consumption by the two screw compressors.
  - There was already successfully implemented solution between EgyFood and El-Dawleya.
- EgyFood Company now realizes the potential savings as it has other motor systems at the plant that could also be epitomized. Using a continuous improvement approach it intends to realize these savings in future projects.

#### For more information:

UNIDO Project Management Unit in Egypt:

Email: [iee-egypt@unido.org](mailto:iee-egypt@unido.org)

Phone: +20 (2) 2380 0357

#### UNIDO Headquarters:

Rana Ghoneim: [r.ghoneim@unido.org](mailto:r.ghoneim@unido.org)

Phone: +43 (1) 26026 4356

or visit: [ieeegypt.org](http://ieeegypt.org)